HighPROTEC | PROTECTION TECHNOLOGY MADE SIMPLE

MRA4 | PROTECTION AND CONTROL RELAY FOR FEEDER, GRID AND GENERATOR APPLICATIONS

APPLICATION

The MRA4 is a high precision and reliable protection and control relay. The intuitive setting concept with plausibility test enables reliable and time optimized configuration of the extensive protection function to a variety of applications such as incoming or outgoing feeder protection, network protection and generator protection.
The implemented switchgear management guaranties an efficient and safe control and supervision.
The device is a bench mark in flexibility and usability and offers various communication options. The hardware is designed for all nominal values in combination with protection and control functionality.
The parameterizing and analyzing software Smart view SE is usable for each HighPROTEC device and free of charge.

SIX STAGES PHASE OVER-CURRENT PROTECTION [1]

- Directional and non-directional
- Voltage controlled and restraint

FOUR STAGES EARTH FAULT PROTECTION [2]

- Non-directional or Directional (multi-polarising)

TWO STAGES UNBALANCED LOAD PROTECTION

VOLTAGE PROTECTION [2]

- Six stages selectable: V<, V>, V<(t)

FLEXIBLE FOURTH VOLTAGE MEASURING INPUT [2]

- 2 stages VE> or VX (for synch-check)

SYNCHRO-CHECK

- Generator-to-System, System-to-System
- Options to switch onto dead bus bars

FREQUENCY PROTECTION

Each of the six stages can be used as:

- f<, f>, ROCOF, vector surge...

SIX STAGES VOLTAGE ASYMMETRY SUPERVISION

POWER PROTECTION

- Six stages power protection each can be used as: P>, P<, Pr, Q>, Q<, Qr, S>, S<
- Two stages power factor (PF)

FRT (LRVT)

- Adjustable LVRT-profiles
- Optionally AR-controlled

Q(V) PROTECTION

- Undervoltage directional reactive power protection with reclosing disengaging

SLIDING AVERAGE VALUE SUPERVISION

- Adjustable (VDE-AR 4105)

DEMAND MANAGEMENT/ PEAK VALUES

- Peak values of current and power, average current and energy demand

POWER QUALITY

- THD protection

SUPERVISION

- Current and voltage transformer supervision
- Circuit breaker failure protection
- Trip circuit supervision
- Cold load pickup
- Switch onto fault

ADDITIONAL HIGHLIGHTS

- Automatic reclosing
- Inrush
- Thermal replica
- Plausibility checks
- Adaptive parameter sets
- Status display
- Comprehensive RMS and DFT measured values and statistics
- Masking of unused functions
- Multi-Password-Level

RECORDERS

- Disturbance recorder, 120 s non volatile
- Fault recorder
- Event recorder
- Trend recorder: 4000 non volatile entries

COMMISSIONING SUPPORT

- Copy and compare parameter sets
- Configuration files are up and down convertible
- Forcing and disarming of output relays
- Fault simulator: current and voltage

COMMUNICATION OPTIONS

- IEC61850
- Profibus DP
- Modbus RTU or Modbus TCP
- IEC60870-5-103

CONTROL

- One switchgear
- Switchgear wear
- Exchange of single lines

LOGIC

- Up to 80 logic equations

TIME SYNCHRONISATION

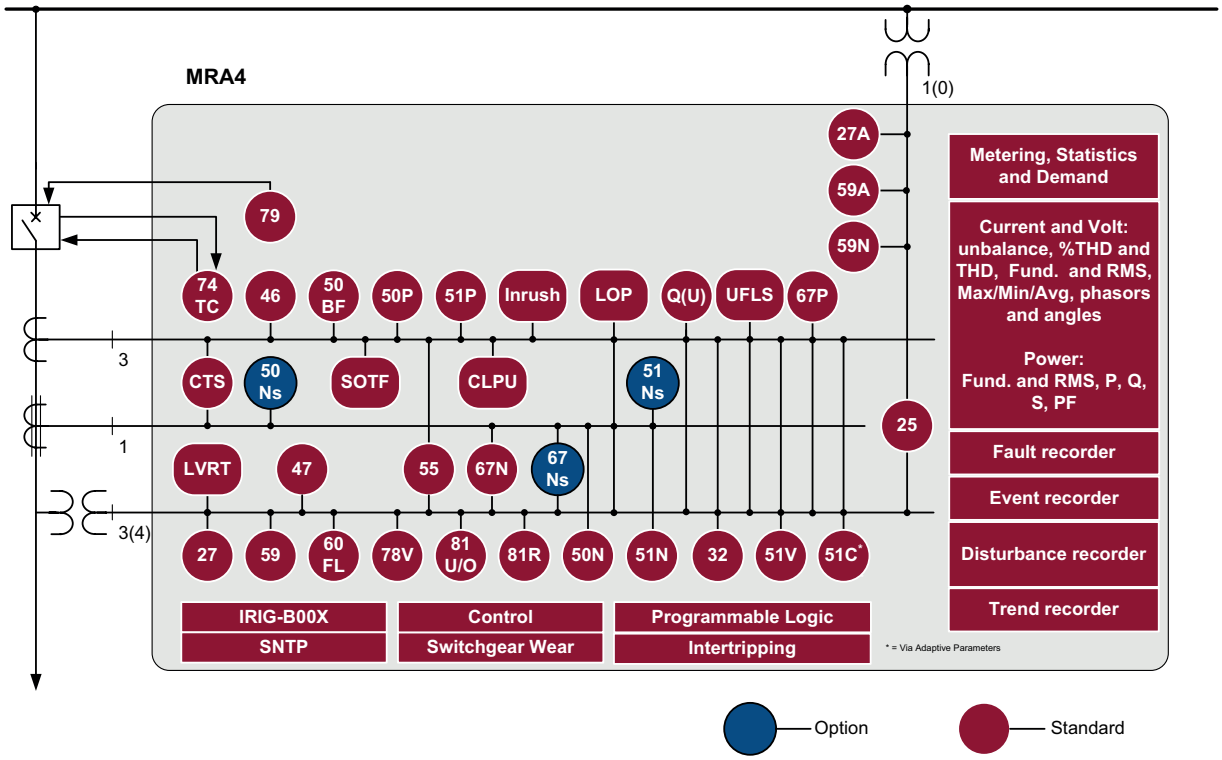
- SNTP or IRIG-B00X

[1] DFT, True RMS or I2 based
[2] DFT or True RMS based

FUNCTIONAL OVERVIEW

	Elements	ANSI
Protective Functions		
I, time overcurrent and short circuit protection, all stages can be configured for directional or non-directional supervision. Tremendous reset options (instantaneous, definite time, reset characteristics according to IEC and ANSI).	6	50P, 51P, 67P
Voltage controlled overcurrent protection by means of adaptive parameters Voltage dependent overcurrent protection Negative phase sequence overcurrent protection		51C 51V 51Q
I2>, unbalanced load protection with evaluation of the negative phase sequence currents	2	46
IB, overload protection with thermal replica and separate pick-up values for alarm and trip functions	1	49
IH2/In, inrush detection with evaluation of the 2nd harmonic	1	Inrush
IG, earth overcurrent and short circuit protection, all stages can be configured for directional (multi-polarising) or non-directional supervision. Tremendous reset options (instantaneous, definite time, reset characteristics according to IEC and ANSI).	4	50N, 51N, 67N
V<, V>, V(t)<, under- and overvoltage protection, time dependent undervoltage protection	6	27, 59
Voltage asymmetry supervision (V012) V1, under and overvoltage in positive phase sequence system V2, overvoltage in negative phase sequence system	6	47
Each of the six frequency protection stages can be used as: f< fs, df, dt, ROCOF, DF/DT, vector surge, ...	6	81U/O, 81R, 78
VX, residual voltage protection or bus bar voltage for synchrocheck	2	59N
AR, automatic reclosing	1	79
ExP, External alarm and trip functions	4	
PQS, Power protection	6	32, 37
PF, Power factor	2	55
FRT (optional coordination with AR-feature)	27 (t)	27 (t, AR)
Q(V) Protection (undervolt. dep. directional reactive power protection with reclosing disengaging)		
10-Minutes-Mean-Square-Sliding Supervision: adjustable according to VDE-AR 4105		
Synchrocheck		25
Control and Logic		
Control: Position indication, supervision time management and interlockings for 1 switchgear		
Logic: Up to 80 logic equations, each with 4 inputs, selectable logical gates, timers and memory function		
Supervision Functions		
CBF, circuit breaker failure protection	1	50BF
TCS, trip circuit supervision	1	74TC
LOP, loss of potential	1	60FL
FF, fuse failure protection via digital input	1	60FL
CTS, current transformer supervision	1	60L
CLPU, cold load pickup	1	
SOTF, switch onto fault	1	
Demand management and peak value supervision (current and power)		
THD supervision		
Switchgear wear with programmable wear curves		
Recorders: Disturbance recorder, fault recorder, event recorder, trend recorder		

FUNCTIONAL OVERVIEW IN ANSI FORM



APPROVALS

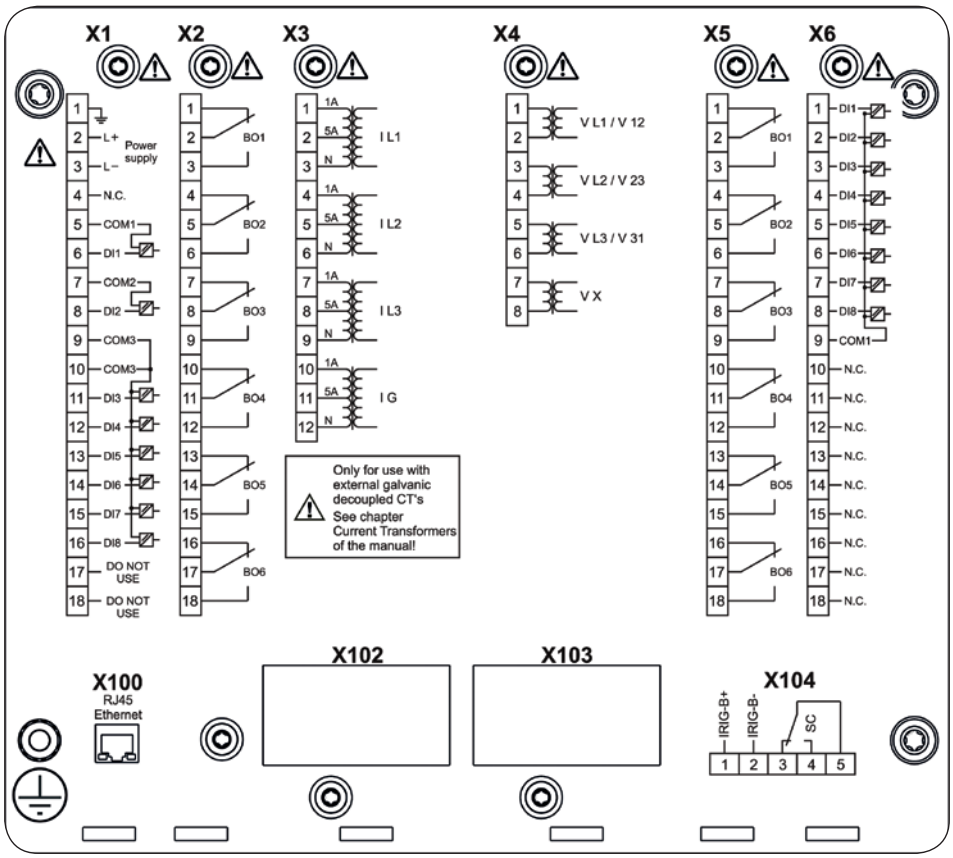
certified regarding UL508 (Industrial Controls)

certified regarding CSA-C22.2 No. 14 (Industrial Controls)

certified by EAC (Eurasian Conformity)

Type tested (and certified) regarding IEC60255-1

CONNECTIONS



ORDER FORM MRA4

Directional Feeder Protection	MRA4				
Digital Inputs	**Binary output relays**	**Housing**			
8	7	B2	A		
16	13	B2	D		
Hardware variants					
Phase current 1 A/5 A, Ground Current 1 A/5 A				0	
Phase current 1 A/5 A, Sensitive Ground Current 1 A/5 A				1	
Housing and mounting					
Door mounting					A
Door mounting 19" (flush mounting)					B
Communication protocol					
Without protocol					A
Modbus RTU, IEC60870-5-103, RS485/terminals					B
Modbus TCP, Ethernet 100 MB/RJ45					C
Profibus-DP, optic fiber					D
Profibus-DP RS485/D-SUB					E
Modbus RTU, IEC60870-5-103, optic fiber					F
Modbus RTU, IEC60870-5-103, RS485/D-SUB					G
IEC61850, Ethernet 100MB/RJ45					H
Available menu languages					
English/German/Russian/Polish/Portuguese/French					

All devices are equipped with IRIG-B interface.

The parameterizing and disturbance analyzing software Smart view is included in the delivery of HighPROTEC devices.

Current inputs	4 (1 A and 5 A) with automatic short-circuiters	
Voltage inputs	4 (0–800 V)	
Digital Inputs	Switching thresholds adjustable via software	
Power supply	Wide range power supply	
	24 V_{DC} - 270 V_{DC} / 48 V_{AC} - 230 V_{AC} (-20/+10%)	
Terminals	All terminals plug type	
Type of enclosure	IP54	
Dimensions of housing (W x H x D)	19" flush mounting:	212.7 mm x 173 mm x 208 mm 8.374 in. x 7.205 in. x 8.189 in.
	Door mounting	212.7 mm x 183 mm x 208 mm 8.374 in. x 7.205 in. x 8.189 in.
Weight (max. components)	approx. 4.2 kg / 9.259 lb	

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